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(71) Applicant(s)
Maxwell Hsu
10F-3 No 357 Sec 4, Ren-Ai-Road, Taipei, Taiwan

(72) Inventor(s)
Maxwell Hsu

(74) Agent and/or Address for Service
Withers & Rogers
4 Dyer's Buildings, Holborn, LONDON, EC1N 2JT,
United Kingdom

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U1S S1185 S1272 S1606 S1631

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UK CL (Edition O) B2J JA , F4V VFC , H5H H4A
INT CL^6 B03C 3/017 , C01B 13/11 , F24F 3/16
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(54) **Enhanced ozone and anion generator**

(57) An enhanced ozone and anion generator, comprising: a housing, provided with at least one air inlet 12, 13 and at least one air outlet path 30; a filter unit 16,17, mounted on said inlet and being provided with at least an electrostatic and dust collecting filter net; a ventilator 21, mounted inside said housing to push air out through said air outlet path; an ozone generating system 50 to produce a high quantity of ozone gas; at least one anion generating device 31, mounted in said air outlet path and generating an ionizing electric field, such that air passing through said air outlet path takes anions with it; and a distributing device 60 to direct ozone gas produced by said ozone generating system, as desired, either through an ozone outlet 72, which is mounted on said housing, or to said outlet path to be mixed with ionized air and to be released into said housing's exterior.

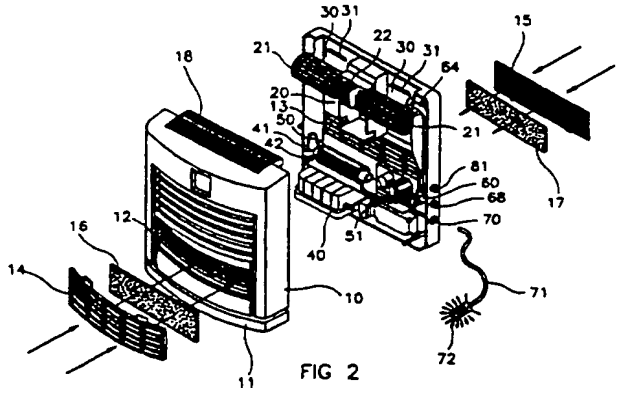

FIG 2

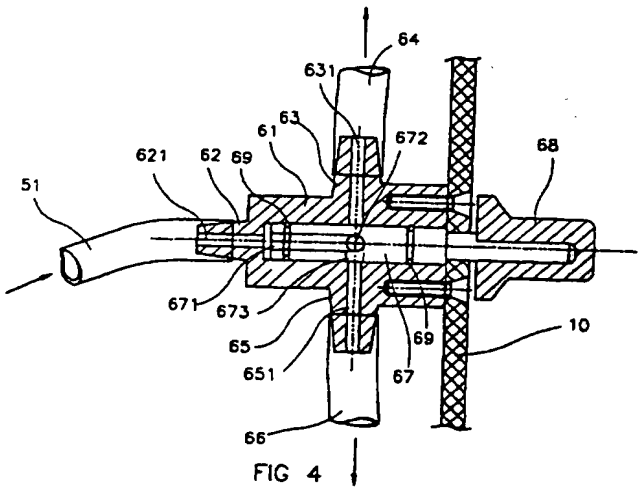

FIG 4

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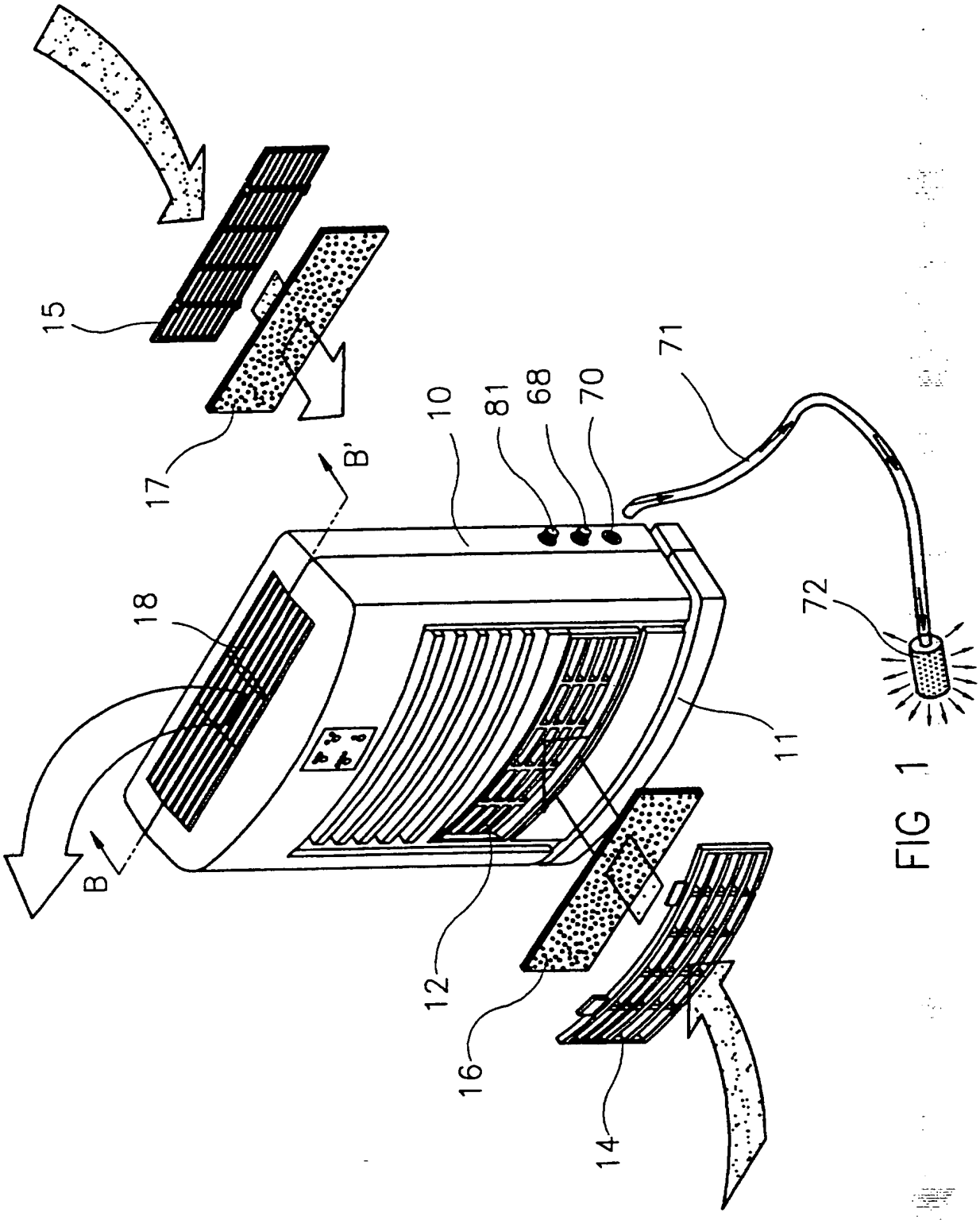

FIG 1

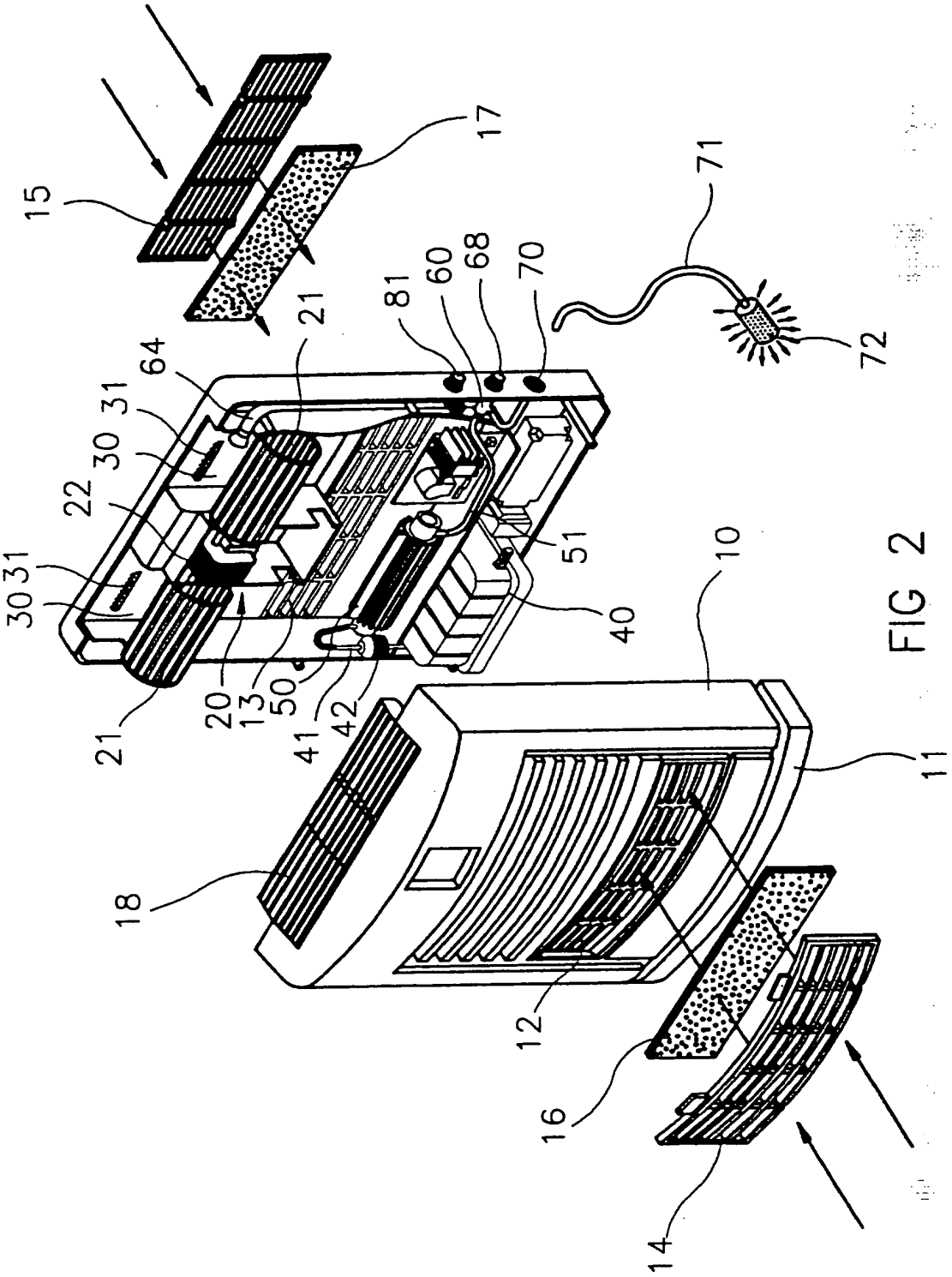

FIG 2

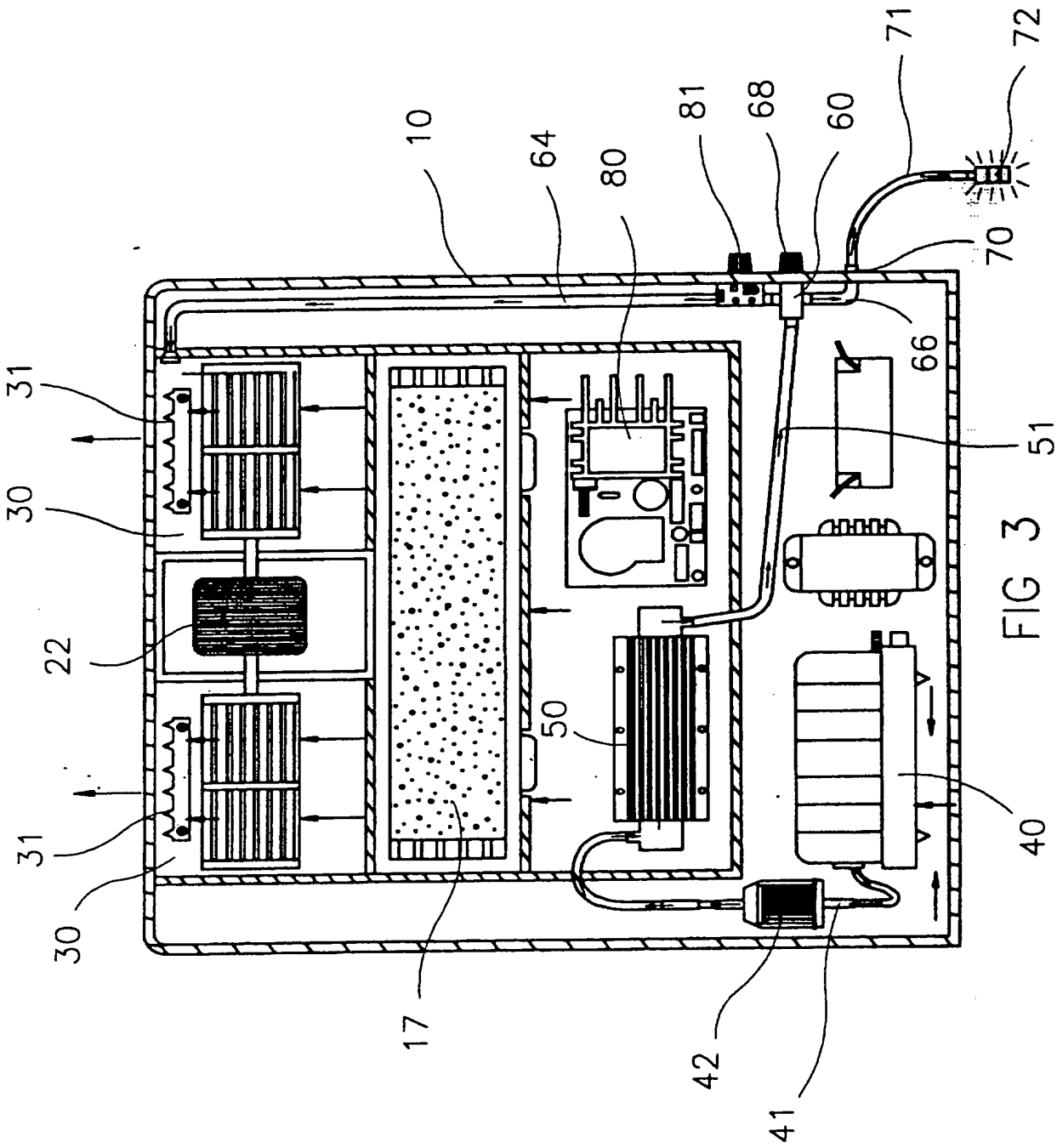

FIG 3

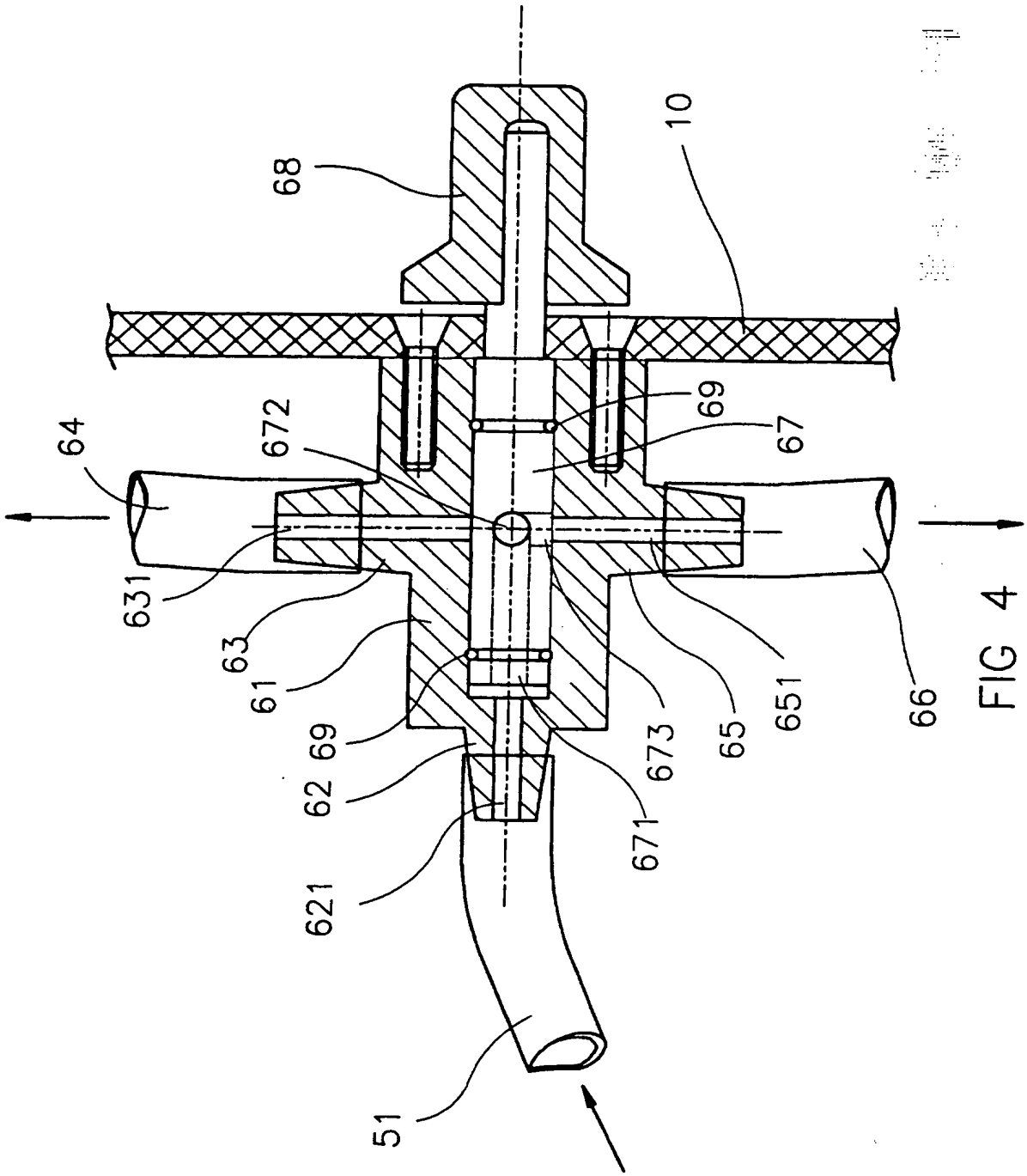

FIG 4

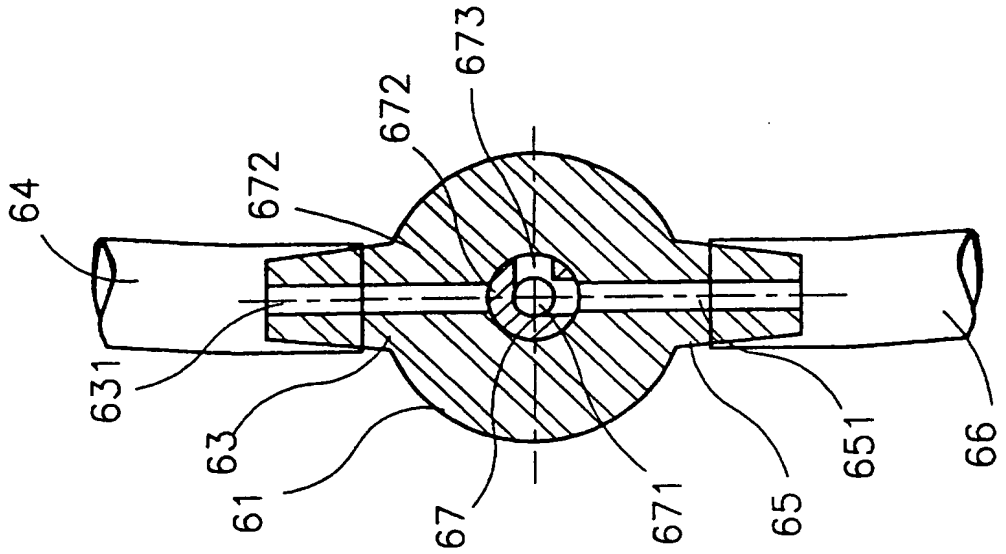

FIG 6

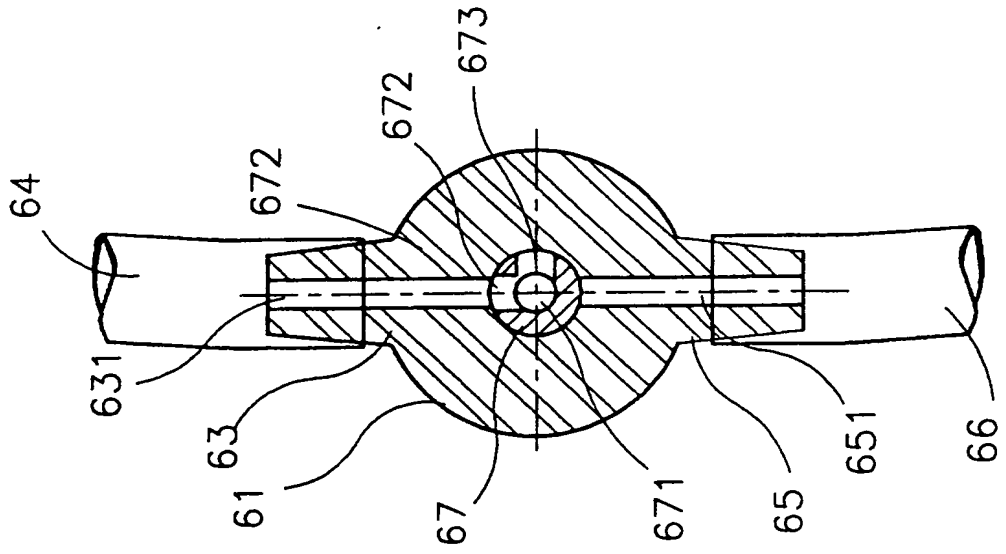

FIG 5

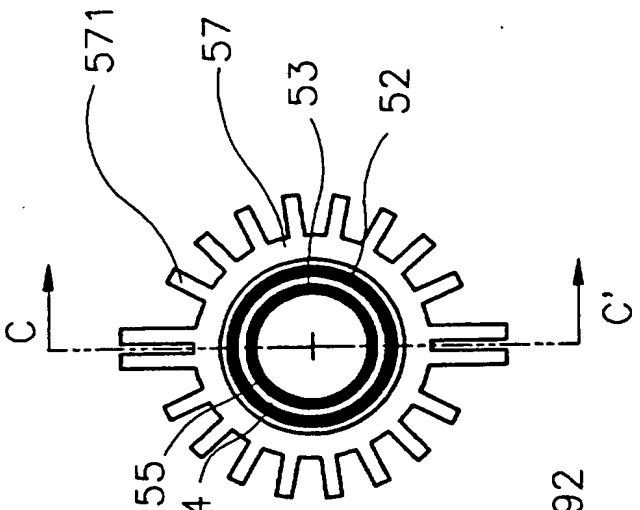

FIG 7

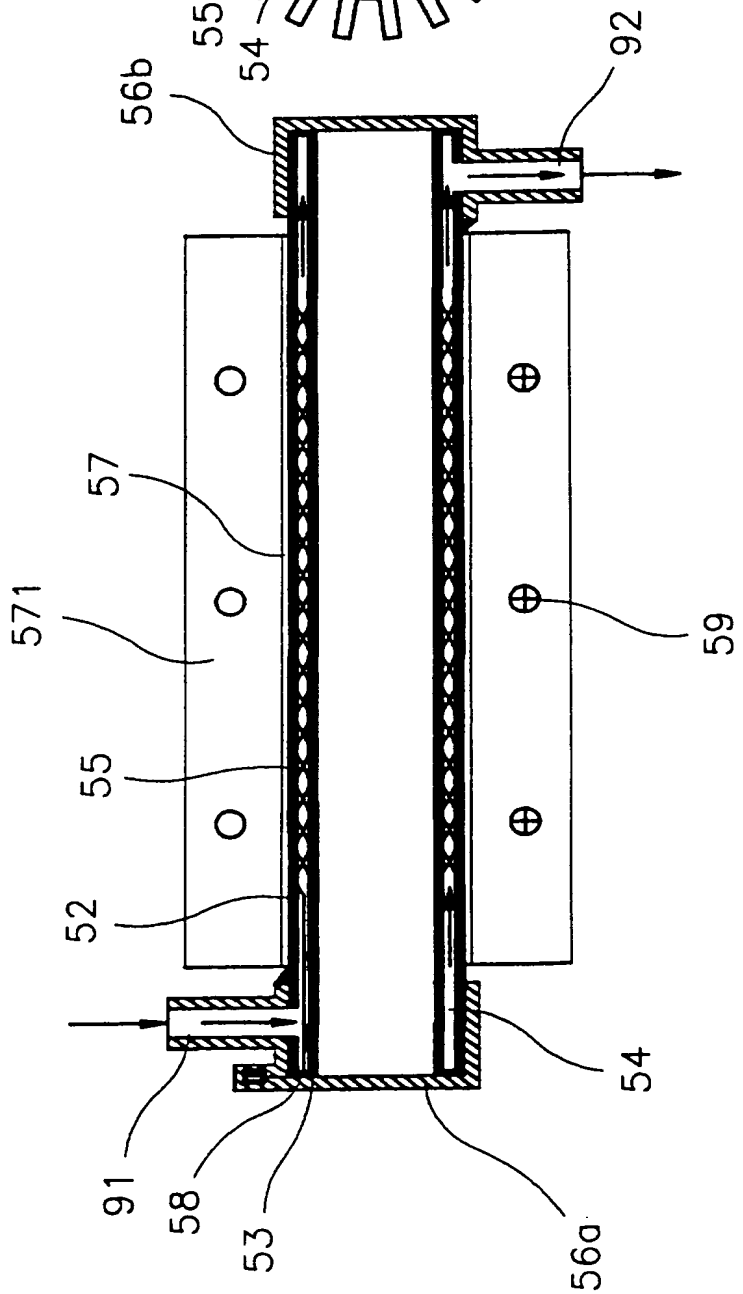

FIG 8

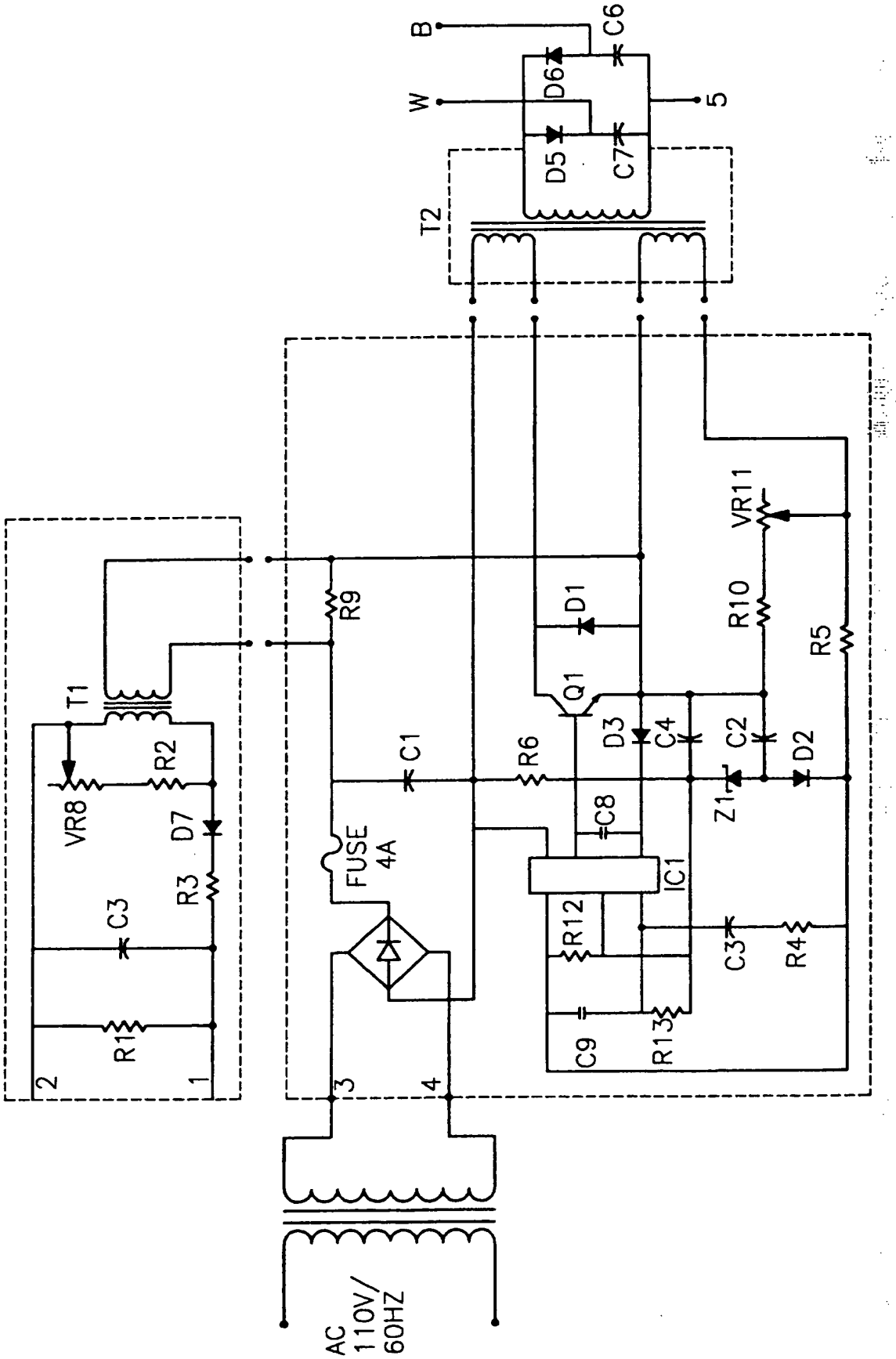
B
C6
D6
W
5
D5
C7
T2
VR11
R10
R5
R9
D1
Q1
T1
R2
C1
R6
D3
C4
C2
D2
VR8
D7
C8
Z1
FUSE
4A
IC1
R3
C3
R12
C3
R4
R1
C9
R13
2
1
3
4
AC
110V/
60HZ

FIG 9

ENHANCED OZONE AND ANION GENERATOR

Technical Field

This invention relates to an enhanced ozone and anion generator, particularly to an enhanced ozone and anion generator integrating the functions of a stand-alone enhanced ozone generator, an anion generator and a mixer of ozone and anion gases.

Background of the Invention

In industry and medicine ozone is widely used to kill microbes, eliminate odor, dissolve poisonous substances, clean water, as well as for beauty, health and hygiene. The oxidizing effect of ozone, especially of pure ozone dissolved in water, is very strong. So it has a function for killing microbes, eliminating odors and dissolving poisonous substances.

Ozone dissolved in water has the following documented effects:

1. Killing of microbes: As experiments show, the killing ability of enhanced ozone in water is 600 to 3000 as much as the killing ability of chlorine. No matter whether coliform bacteria, staphylococci or salmonellae are concerned, they can all be completely eliminated in a short time.

2. Elimination of odor: Elimination of bad odors in water or of bad smell of fish, shrimp and crabs.

3. Bleaching: Oxidization and decomposition of harmful pigments, removing color and bleaching.

4. Removal of insecticides in vegetables and fruit: Oxidization, decomposition and neutralisation of poisonous substances and removal of remaining insecticides in vegetables and fruit.

5. Removal of chlorine and cleaning of water: Ozone has the ability to oxidize and decompose water-polluting substances like trichloromethane, benzol, phenol, iron and manganese. In a bath or a swimming pool the water quality will so be improved by killing microbes, eliminating odor, dissolving poisonous substances and cleaning the water.

6. Beauty: When washing the body, ozone water removes inflammations, kills microbes, bleaches, dissolves poisonous substances and removes pimples, stains, dark spots and freckles, enhancing beauty and vitalizing the skin.

7. Healing: When ozone is used while washing the body, ozone water removes inflammations, kills microbes, dissolves poisonous substances, furthermore it takes dirt particles out of skin pores, leaving the skin spotlessly clean and allowing it to breathe oxygen, cleaning blood, vitalizing cells and furthering blood circulation and metabolism.

Other effects of enhanced ozone in the air include:

1. Enhanced ozone kills effectively microbes in the air, like coliform bacteria, staphylococci and salmonellae as well as worms, mold and filterable viruses.

2. Elimination of bad odor: Enhanced ozone eliminates effectively bad odors generated by pet shops,

chicken farms, pig farms, fish markets, in hospitals, sanitaria, refrigerators, wardrobes, shoe cabinets, restrooms, bathrooms, bas ments etc.

3. Removal of poisonous substances: Ozone removes all kinds of poisonous gases, like carbon monoxide, sulfides, nitrogen hydrides, exhaust fumes, ammonium, benzol etc.

4. Preserving freshness of vegetables and fruit: Ozone protects food from rotting, prevents mold, bacteria, cocci and coliform bacteria from multiplying, extends staorage time for food and preserves the freshness of food and fruit.

5. Increasing oxygen, beauty, hair care: After washing the hair and exposing it to ozone for 3 - 5 minutes, the hair roots take in oxygen and the hair tips are strengthened. Then the hair will not break easily and retains its color and elasticity.

6. Healing and health care: Breathing ozone in a small concentration provides a fresh feeling, the oxygen content of the blood increases, vitalizing cells, furthering metabolism, taking away fatigue. Furthermore, sleeplessness, headache, long-term bronchitis and catarrh are quickly and effectively combated.

7. Cleaning the air: Ozone eliminates indoor cigarette smoke, damp smell, bad odor, mold flying about, red dysentery bacteria and tuberculosis bacteria. At the same time, ozone in a small concentration takes away fatigue and cleans the air.

Although ozone has the advantages mentioned above, due to the difficulties to generate ozone, its use has

been mainly limited to industry and medicine. Only in the last few years ozone generators for household use have appeared.

There are also many air cleaning devices available using electrostatic precipitation to remove polluting particles from the air. They use electric discharges to produce anions in the air. Then the air of the room passes continuously on a circular path through an electrostatic filter, such that particles are effectively removed. Many devices generate ozone to assist in cleaning the air.

Conventional air treating devices mostly are stand-alone ozone generators or stand-alone anion generators, not both of them.

Furthermore, common ozone generators for household use mostly are employed to clean the air within a room. In practice, however, in a household several enclosed spaces can be found. If an ozone generator can be used there for killing microbes, getting rid of odor and removing poisonous substances, it will have a beneficial effect, e.g., to kill the microbes, prevent damp smell and get rid of odor in shoe cabinets, wardrobes and refrigerators. But conventional ozone generators normally cannot be used for getting rid of odor and removing poisonous substances in a small space.

Some of the air cleaning devices generate ozone and anions at the same time, so there is no need to purchase two machines to supply ozone and anion gas. Within them, the ozone generator has an output that is separated from the output of the anion generator, so ozone can be

separately generated and, via a duct connected to th ozone output, led into a small enclosed spac or into water to be effective there in the tasks of killing microbes, getting rid of odor or cleaning the water and removing insecticides from vegetables and fruit.

In those air cleaners with ozone and anion output, however, because their ozone output and their anion output are separate from each other, the ozone output pressure is very large (0.5 - 0.9 kg/cm^2). So the ozone is output in a high concentration and does not easily spread. As to ozone's physical properties, its weight is 1.7 times the oxygen's weight. Therefore, after being output, ozone immediately drops down and spreads only slowly. So the ozone concentration close to the ozone output is too high, causing people breathing too much of it to feel dizzy.

Conventional ozone generators for household use mostly employ electrostatic discharge and develop a corona discharge, in which oxygen of the air in a reaction forms ozone. But due to the limited volume of the electric poles in conventional ozone generators the electrically charged area is small, and the amount of ozone generated is too small for the effect of killing microbes and getting rid of odor. After prolonged use dust, humidity and fat in the air impede the generation of ozone.

Summary of the Invention

The main objective of this invention consists in providing an enhanced ozone and anion generator with

separate enhanced ozone and anion outputs and a combined enhanced ozone and anion output.

A further objective of this invention consists in providing an enhanced ozone and anion generator, which evenly spreads ozone in the air of a room to prevent humans from inhaling ozone of a too high concentration and to effectively kill microbes and get rid of odor.

A further objective of this invention consists in providing an enhanced ozone and anion generator, which delivers a high output of ozone and operates stably without breakdowns.

Brief Description of the Drawings

Fig. 1 is a three-dimensional view of this invention's apparatus.

Fig. 2 is an exploded three-dimensional view of this invention.

Fig. 3 is a sectional view of this invention taken along the line B-B' of Fig. 1.

Fig. 4 is an enlarged sectional view of the ozone output device used in this invention.

Fig. 5 and 6 are schematic illustrations of the movement of the ozone output device used in this invention.

Fig. 7 is a side elevation of this invention's ozone generating device.

Fig. 8 is an elevational view in section of this invention's ozone generating device taken along the line C-C' of Fig. 7.

Fig. 9 is a circuit diagram of this invention's high-voltage, high-frequency circuit.

Best Mode to Carry out the Invention

Fig. 1 and 2 show the housing system of this invention's enhanced ozone and anion generator. It comprises a case 10, which at its bottom has a base 11, allowing the case to stand vertically.

The front side and the back side of the case 10 each are provided with a collecting grate 12 and 13. On th outer side of each of the collecting grates 12 and 13 an inlet grate 14 and 15 is mounted. Between each collecting grate and inlet grate a filter 16 or 17 is inserted, each consisting of a fiber layer, an active carbon layer and an electrostatic layer. Thus by physical, chemical and electrostatic methods harmful particles and chemical substances in the air entering the air cleaner are held back.

On the top side of the case 10 an outlet grate 18 is mounted to release processed air.

A ventilator 20 is installed inside the case 10 close to the outlet grate 18.

As shown, the ventilator's 20 blades 21 rotate, as driven by the motor 22.

The space between the ventilator 20 and the outlet grate 18 is shaped as an outlet path 30. Several electric discharge needles 31 extend into the outlet path 30.

During operation, as shown in Fig. 1 and 4, the ventilator 20 takes in surrounding air through the inlet grates 14, 15 and the filters 16, 17.

The air passes through the interior of the case 10 all the way to the outlet path 30.

When the air passes through the outlet path 30, with the discharge needles 31 generating a static electric field, the electric field induces negative static charges in the air flowing by.

The air finally flows through the outlet grate 18 out of the case 10 and returns to the surrounding environment.

Continuous operation of the ventilator 20 causes from time to time ionized air to flow again into the interior of the case 10.

When ionized air is drawn again into the interior of the case 10, it will come into contact with the positively charged filters 16 or 17, where the positive static charge has been induced by the collecting grates 12 and 13.

The collecting grates 12 and 13 are electrically connected to the circuitry of this invention's apparatus and carry a positive charge.

The filters 16 and 17 maintain physical contact with the collecting grates 12 and 13, respectively. Thereby the filters 16 and 17 are able to electrostatically precipitate the negatively charged particles passing through. Harmful chemical substances in the air are absorbed by the active carbon layers of the filters 16 and 17.

So the filters 16 and 17 have a mechanical, a chemical and an electrostatic filtering ability at the same time.

The ozone generating capability of this inv ntion is mainly achieved by means of an ozone generating d vic 50.

As shown in fig. 2 and 3, an air pump 40 is installed inside the case 10. The air pump 40 takes in air through a pump inlet and pushes it out through a pump outlet duct 41.

The pump outlet duct 41 is connected to the ozone generating device 50. A filter 42 is installed within the pump outlet duct 41 to remove humidity, dust and fat before entering the ozone generating device 50, thus ensuring the ozone generating device's 50 proper function.

Typically the air pressure generated by the air pump 40 lies in the range of 0.1 - 0.9 kg/cm^2.

When air has entered the ozone generating device 50, it is exposed to electricity in the ozone mixing chamber, and oxygen decomposes, forming ozone. Then the mixture of air and ozone is taken out through an ozone outlet duct 51, which is connected to an ozone outlet fitting 60.

The most important characteristic of this invention is that the ozone output fitting 60 allows to output the ozone gas either through the outlet path 30 to be mixed with ionized air, or through an extra ozone outlet 70, which is installed on the case 10.

As shown in fig. 3 and 4, the ozone output fitting 60 is provided with a three-way tap 61, which is fastened to the case 10. The three-way tap 61 has an inlet 62, connecting to the ozone outlet duct 51, a first outlet 63, which by way of a duct 64 connects to the outlet path

30, and a second outlet 65, which by way of a duct 66 connects to the ozone outlet 70 on th case 10. A shaft 67 is rotatably inserted into the three-way tap 61 to switch as desired between the first outlet 63 and the second outlet 65 as ozone output. A turning knob 68, which is accessible from the outer side of the case 10, is linked to the shaft 67 and is used to turn it.

As shown in fig. 4, the inlet 62 of the three-way tap 61 is provided with a through hole 621 to let ozone gas enter the three-way tap 61. The through hole 621 shares a common axis of the bore with the shaft 67. It is aimed at the entrance of a gas path 671 within the shaft 67. The gas path 671 is bored into the shaft 67 from the side of the inlet 62, but it does not go all the way through the shaft 67.

The through holes 631 and 651 of the first outlet 63 and the second outlet 65, respectively, intersect with the axis of the bore of the shaft 67. The shaft 67 is further provided with two link borings 672 and 673, which aim at the through holes 631 and 651, respectively, and are each linked to the gas path 671. As shown in fig. 5, when the user turns the shaft 67 by an angle that aligns the link boring 672 with the through hole 631, then the ozone gas coming from the ozone outlet duct 51 flows through the first outlet 63 and duct 64 to the outlet path 30 of the ionized air, is mixed with the ionized air and finally released. As shown in fig. 6, when the user turns the shaft 67 by an angle that aligns the link boring 673 with the through hole 651, then the ozone gas coming from the ozone outlet duct 51 flows through the

second outlet 65 and duct 66 and is released through the ozon outl t 70.

Furthermore, two packing rings 69 ar put on the shaft on both sides of the outlets 63 and 65 to seal the space between the shaft 67 and the body of the three-way tap 61. So no ozone gas will leak through the space between the shaft 67 and the body of the three-way tap 61.

When this invention's enhanced ozone and anion generator is operated to clean the air in a room, the shaft 67 is turned to align the link boring 672 with the through hole 631, and ozone gas flows through duct 64. The duct's 64 exit lies within the outlet path 30 for ionized air. So ozone gas will mix there with ionized air and only then be released into the room air, rather than flow in a high concentration into the room air. The ozone gas, after leaving duct 64, is carried by the air flow generated by the ventilator 20 to be mixed with the air in the room. So it will be spread evenly in the room rather than be confined to a small space with a high concentration, avoiding an uncomfortable feeling of inhaling persons and effectively killing microbes and getting rid of poisonous substances in the whole room.

When the enhanced ozone generated by the apparatus of this invention is used in an enclosed space to kill microbes and to get rid of poisonous substances, or is used to clean water and remove insecticides from vegetables and fruit, the three-way tap is adjusted to let the ozone flow out of the ozone outlet 70. Connected to the ozone outlet 70 is an extension duct 71, whose

open end leads into a gas spreading d vice 72. The open end of the xtension duct 71 may be inserted into a wardrobe, a shoe cabinet, a refrigerator and other small spaces or it may be submerged in water, such that ozone effectively performs the tasks of killing microbes, getting rid of odor and removing damp smell in a small space or, when released under water, the tasks of oxidizing microbes and harmful chemical substances to kill microbes, eliminate odor, bleach, dechloridize and remove insecticides from vegetables and fruit.

Another characteristic of this invention is the ability of the ozone generating device 50 to generate a high quantity of ozone gas as compared to conventional ozone generating devices. At the same time the ozone generating function is not impaired by dust, humidity or fat in the air.

As shown in fig. 7 and 8, this invention's ozone generating device 50 comprises a first tube 52 and, concentrically within the first tube 52, a second tube 53. Between the first tube 52 and the second tube 53 there is a gap 54. Both ends are sealed by the endpieces 56a and 56b to form a gas mixing chamber in between. In the gap 54 a net-like discharge electrode 55 is inserted, surrounding the second tube 53. The first tube 52 is surrounded by induction electrode 57.

The net-like discharge electrode 55 leads to one electric terminal 58. The induction electrode constitutes the other terminal 59. Both terminals are connected to the terminals W and B of a high-voltage, high-frequency circuit 80.

The first tube 52 and th second tube 53 ar made of heat-resistant insulating material, e.g. glass or quartz, to withstand the heat of the electric discharge. Th first tube 52 serves also as an insulating layer between the net-like discharge electrode 55 and the induction electrode 57.

The endpieces 56a and 56b each have an inlet tube 91 or an outlet tube 92. The inlet tube 91 is connected to the pump outlet duct 41 of the air pump 40 and lets th compressed air pass through the endpiece 56a into the gap 54. The outlet tube 92 is connected to the ozone outlet duct 51 to bring ozone gas to the ozone outlet fitting 60.

After compressed air has entered the gap 54, the circular flow to the outlet tube 92 mixes air and ozone.

Due to the narrow gap 54 the mixing of air and ozone is very effective.

By way of the small mixing volume and the high pressure of the air there will be to the generation of a high quantity of ozone. This method is more advantageous than simply ventilating a comparatively large volume to generate ozone and mix it with air.

When the high-voltage, high frequency circuit 80 is turned on, then between the net-like discharge electrode 55 and the induction electrode 57 a corona discharge develops. After compressed air, driven by the air pump 40, has entered the gap 54 through the inlet tube 91, the oxygen molecules (O_2) in the electric field decompos into oxygen atoms (O), then oxygen atoms (O) and oxygen molecules (O_2) react to form ozone molecules (O_3). The

ozone molecules flow through the outlet tube 92 to the ozone outlet fitting 60, then, according to the adjustment of the ozone outlet fitting 60, end up in the outlet path 30 of anions to be used for cleaning room air or they end up in the ozone outlet for another special use.

The induction electrode 57 in this embodiment of the invention is made of aluminium or another metal and is provided with radiator-fins 571. Thereby heat from the ozone generating device 50 will be dissipated.

Since the net-like discharge electrode 55, the induction electrode 57 and the first and second tube 52, 53 are concentrically wrapped into one another, the ozone generating device 50 of this invention has a large area exposed to an electric field. The length of the first and second tube 52, 53 is rather large, so the compressed air having entered the gap 54 has enough time to be exposed to the corona discharge caused by the net-like discharge electrode 55. Therefore the ozone generating device 50, as compared to conventional ozone generating devices, is able to produce more ozone gas in a smaller volume. A higher quantity of ozone will be output, and the tasks of killing microbes, removing odor, dissolving poisonous substances, cleaning water and removing insecticides from vegetables and fruit will be suitably performed.

Since the area used for exposure to an electric field is very large, even if a part of the area is disabled by dust, humidity or fat in the air, the remainder of the area is still large enough to ensure a proper function. So the effectiveness of the ozone

generating device 50 in producing a high quantity of ozone remains stable over a long time.

As shown in fig. 9, the high-voltage, high frequency circuit 80 of this invention is in principle is made up by a transistor Q1 oscillating with a high frequency and a transformer T2. As shown, the power supply is a standard 110 V, 60 Hz supply. The circuit generates pulsating direct current in the range of 10 kV, 25 kHz.

After that, by way of the diode D5 and the capacitor C7 on the secondary side of the transformer T2 the high-frequency oscillations become pulses of positive electric voltage led to terminal W, and by way of the diode D6 and the capacitor C6 the high-frequency oscillations become pulses of negative electric voltage led to terminal B. The terminals 58 and 59 are connected to the terminals W and B, respectively, to supply high voltage to the ozone generating device 50 for the production of ozone gas.

The ozone gas pressure produced by this invention's apparatus is 0.5 - 0.9 kg/cm^2. It is determined by the air pump's 40 generated pressure. The hourly ozone gas quantity produced by this invention's apparatus is 0 - 750 mg/hour. By way of the adjustable resistor VR8 the output frequency of the high-voltage, high frequency circuit 80 is controlled, determining the hourly ozone gas quantity, according to various needs. A knob 81 on the case 10 of this invention is used to adjust the adjustable resistor VR8.

The enhanced ozone and anion generator of this invention can be operated to produce only ozone gas for special tasks like killing microbes, dissolving poisonous

substances, removing odor, cleaning water, beauty, preserving vegetables and fruit and providing increased oxygen for hair care. It can also be operated to produce only ionized air to clean the air, or it can be operated to produce a mixture of ozone gas and ionized air to kill microbes, remove odor and clean the air in a room. This invention combines three operating modes in one apparatus, providing a big advantage for its operation.

CLAIMS

What is claimed is:

1. An enhanced ozone and anion generator, comprising:

a housing, provided with at least one air inlet and at least one air outlet path;

a filter unit, mounted on said inlet and being provided with at least an electrostatic and dust collecting filter net;

a ventilator, mounted inside said housing to push air out through said air outlet path, and at least one anion generating device, mounted in said air outlet path and generating an ionizing electric field, such that air passing through said air outlet path takes anions with it;

an ozone generating system to produce ozone gas; and

a distributing device to direct ozone gas produced by said ozone generating system, as desired, either through an ozone outlet, which is mounted on said housing, or to said outlet path to be mixed with ionized air and to be released into said housing's exterior.

2. An enhanced ozone and anion generator as claimed in claim 1, wherein said distributing device further comprises:

a three-way tap;

an inlet, which is connected to said ozone generating system to lead ozone gas into the interior of said three-way tap;

a shaft, which is rotatably inserted in said three-way tap and whose interior is provided with a gas path connected to said inlet;

a first outlet, which is installed in said three-way tap and via a duct connected to said air outlet path;

a second outlet, which is installed in said three-way tap and connected to said ozone outlet;

at least one hole in said shaft, which connects to said gas path and is, by way of rotating said shaft, aligned with either said first outlet or said second outlet to allow ozone gas in said gas path to flow out either via said first outlet or said second outlet, as desired.

3. An enhanced ozone and anion generator as claimed in claim 1, wherein said ozone generating system further comprises:

an air pump;

an ozone generating device, further comprising:

a first tube, made of heat-resistant material;

a second tube, which is installed concentrically inside said first tube, being from said first tube separated by a gap;

a first endpiece, which is tightly mounted on one end of said first and second tube and is connected to said air pump to lead compressed air that is output by said air pump into said gap between said first and second tube;

a second endpiece, which is tightly

mounted on one end of said first and second tube and is connected to said three-way tap to lead ozone produced by said ozone generating device to said three-way tap;

a net-like discharge electrode, which is installed in said gap, surrounding said second tube; and

an induction electrode, surrounding said first tube; and

a high-voltage, high-frequency circuit, which is connected to said discharge electrode and said induction electrode, generating pulses of high-voltage, high-frequency electric current, thus causing a corona discharge between said discharge electrode and said induction electrode;

wherein, after compressed air that is output by said air pump has entered said gap, a reaction in the electric field generated by said electrodes produces ozone gas, which is led out through said second endpiece.

4. An enhanced ozone and anion generator as claimed in claim 3, wherein said induction electrode is provided with a plurality of radiator-fins.

5. An ozone generating system to be used in an enhanced ozone and anion generator, comprising:

a first tube, made of heat-resistant material;

a second tube, which is installed concentrically inside said first tube, being from said first tube separated by a gap, wherein said first and second tube are sealed together on both ends, such that said gap between said first and second tube forms a sealed mixing chamber;

an air inlet, which is provided on one end of

said first and second tube allowing compressed air to enter said gap between said first and second tube;

an ozone outlet, which is provided on one end of said first and second tube allowing ozone generated in said ozone generating system to be taken out;

a net-like discharge electrode, which is installed in said gap, surrounding said second tube; and

an induction electrode, surrounding said first tube; and

a high-voltage, high-frequency circuit, which is connected to said discharge electrode and said induction electrode, generating pulses of high-voltage, high-frequency electric current, thus causing a corona discharge between said discharge electrode and said induction electrode;

wherein, after compressed air that is output by said ventilator has entered said gap, a reaction in the electric field generated by said electrodes produces ozone gas, which is led out through said ozone outlet.

6. An ozone generating system as claimed in claim 5, wherein said induction electrode is provided with a plurality of radiator-fins.

7. An ozone generating system as claimed in claim 5, wherein an air pump is additionally provided to compress air and lead thereby compressed air through said air inlet into said gap between said first and second tube.

8. An ozone generating system as claimed in claim 7, wherein a filter is installed between said air pump and said first and second tube to filter out humidity,

dust and fat contained in th air.

9. An ozone g nerating system to be used in an ozone generator, wherein said ozone generator has at least one air outlet path to provide for an outlet of processed air and an ozone generating system to produce ozone gas, said ozone generating system including:

an ozone outlet, mounted on said ozone generator; and

a three-way tap, further comprising:

an inlet, which is connected to said ozone generating system to lead ozone gas into the interior of said three-way tap;

a shaft, which is rotatably inserted in said three-way tap and whose interior is provided with a gas path connected to said inlet;

a first outlet, which is installed in said three-way tap and via a duct connected to said air outlet path;

a second outlet, which is installed in said three-way tap and connected to said ozone outlet;

at least one hole in said shaft, which connects to said gas path and is, by way of rotating said shaft, aligned with either said first outlet or said second outlet to allow ozone gas in said gas path to flow out either via said first outlet or said second outlet, as desired;

wherein ozone gas produced by said ozon generating system is directed, as desired, either through said ozone outlet or to said outlet path to be mixed with air in said outlet path and to be released into said

ozone generator's exterior.

10. An ozone generating system as claimed in claim 9, wherein an extension duct is connected to said ozone outlet to lead ozone gas into a special enclosed space or into water.

11. An ozone generating system as claimed in claim 9, wherein two packing rings are put on said shaft to both sides of said link hole to seal the gap between said three-way tap's body and said shaft.

The Patent Office

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Claims searched: 1-4,9-11

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Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

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Int Cl (Ed.6): C01B [13/11]; F24F [03/16]; B03C [3/017]

Other: ONLINE: WPIL

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB0684064A PLUMBERS	
A	GB0501154A WALTER	
A	WPI Abstract Accession No 95-101652[14] & JP07025602 (TOYOTA) 27-01-95 (see abstract)	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.